Course: COMP 571
Term: Spring 2015
Room: Herzstein 210
Class: TTh. 2:30-3:45

Instructor Contact Information

Instructor: Luay Nakhleh
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Teaching Assistant

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Course Objectives and Learning Outcomes

The course covers mathematical and algorithmic techniques for analyzing biological sequence data (DNA, RNA, and amino acid sequences). The course focuses on sequence alignment, phylogeny reconstruction, phylogenomics, techniques for genome assembly, and topics from population genetics. The goal is for students to understand the mathematics and algorithms behind the software tools that are commonly used to analyze biological data (as opposed to teaching how to use the tools).

Required Texts and Materials

While no textbook is required, several books are recommended, including:

- Biological sequence analysis: Probabilistic models of proteins and nucleic acids, by Durbin et al., Cambridge University Press
- Algorithms on strings, trees, and sequences, by Gusfield, Cambridge University Press

A tentative list of topics (we'll cover as many topics as time permits):

- Pairwise sequence alignment
- Markov chains and hidden Markov models
- Pairwise alignment using HMMs
- Profile HMMs for sequence families
- Multiple sequence alignment
- Phylogenetic tree inference
- Phylogenomic analyses (the multispecies coalescent, incomplete lineage sorting,…)
- Suffix trees
- The Burrows-Wheeler Transform
- Genome characteristics and annotation
- Stochastic context-free grammars and RNA secondary structure prediction

Exams and Papers

There will be two in-class exams:

- Exam 1: February 26, 2015
- Exam 2: April 23, 2015

There will be one class project with a report due by the last day of finals (May 6, 2015)

Grade Policies

The grade is determined as follows:

- Homework assignments: 30%
- Project: 30%
- Exam 1: 20%
- Exam 2: 20%

Assignment of letter grades will be no stricter than the following:

- A: final grade ≥90
- B: 80 ≤ final grade < 90
- C: 70 ≤ final grade < 80
- D: 55 ≤ final grade < 70
- F: final grade < 55

Absence Policies

Attendance will not be taken. However, students are expected to attend and be aware of all announcements made in class.

Rice Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Students from other institutions will also be held to the same standards of the Rice Honor Code.

Disability Support Services

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Syllabus Change Policy

This syllabus is only a guide for the course and is subject to change with advanced notice.